

Aalto University  
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## **Annex E: Laboratory premises**

Version 1.4

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## 1. Location and layout of the laboratory

The laboratory rooms of MIKES-Aalto Mittaustekniikka are located in the first floor of the TUAS-Building, Maarintie 8. The layout of the laboratories is shown in Figure 1.

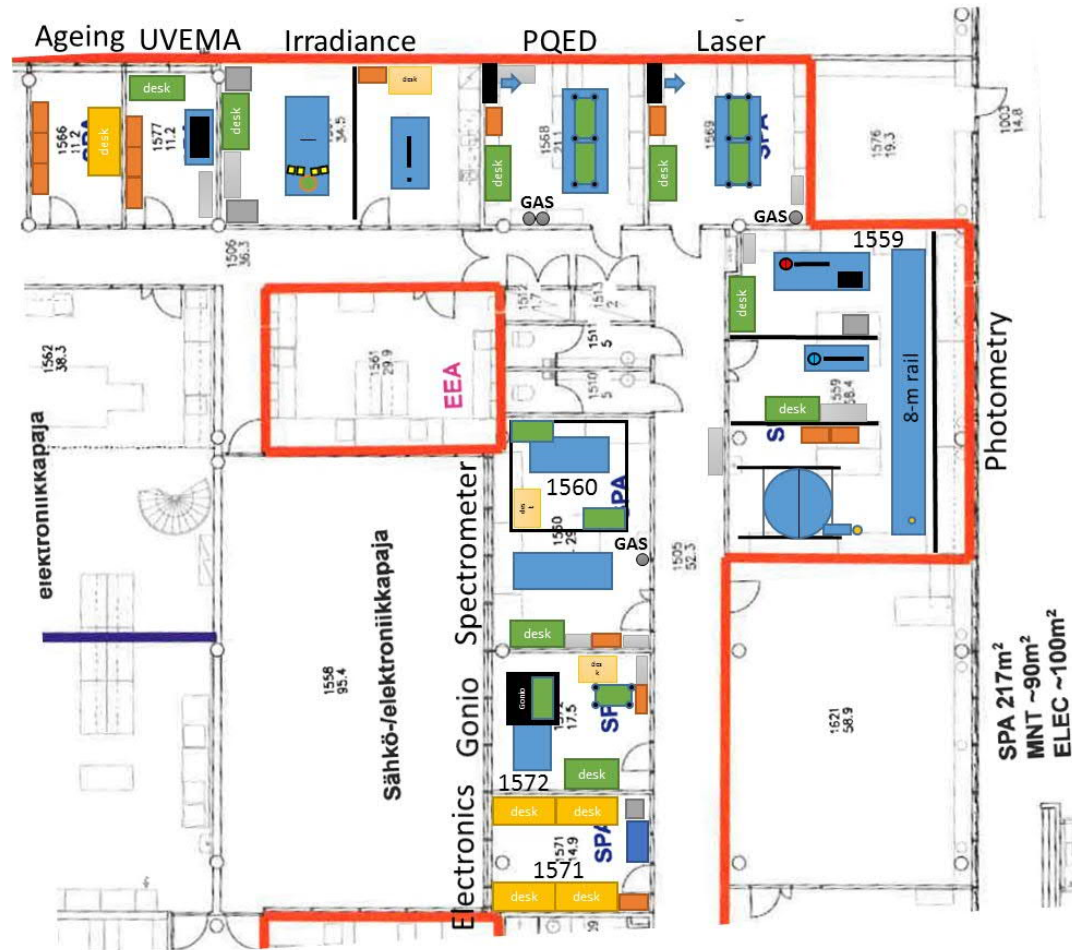


Figure 1: Layout of the laboratories of MIKES-Aalto Mittaustekniikka.

## 2. Laboratory rooms

The laboratory rooms, their permanent measurement setups, and typical calibration activities are listed below. In addition to the setups listed, the rooms may house a number of other temporary setups and calibration activities.

### 2.1. Electronics laboratory (1571)

Permanent setups: Tables and tools for building electronics. Optical component storage.

Calibration activities: None

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Temperature control: No

Air cleaner: No

Person(s) in charge: Farshid Manoocheri

## **2.2. Gonio laboratory (1572)**

Permanent setups: Gonioreflectometer [5], PerkinElmer LS-55 fluorescence spectrometer.

Calibration activities: Diffuse reflectance, specular reflectance, fluorescence.

Temperature control: Yes

Humidity control: Yes

Air cleaner: Yes

Person(s) in charge: Dmitri Lanevski

## **2.3. Spectrometer laboratory (1560)**

Permanent setups: Reference spectrometer [4], PerkinElmer Lambda 900 spectrophotometer.

Calibration activities: Spectral responsivity, filter transmittance, absorbance, diffuse reflectance, specular reflectance.

Temperature control: Yes

Humidity control: Yes

Air cleaner: Yes (special no-dust assembly)

Nitrogen bottle

Person(s) in charge: Farshid Manoocheri

## **2.4. Photometry laboratory (1559)**

Permanent setups: 1.65-m integrating sphere setup for luminous flux and luminous efficacy measurements [1, 2], integrating sphere luminance source [3]. 8-m optical rail

Calibration activities: Luminous flux, spectral radiance, luminance, luminance responsivity, Correlated color temperature, illuminance, illuminance responsivity.

Temperature control: Yes

Humidity control: Yes

Air cleaner: Yes

**Nitrogen bottle & Oxygen bottle**

Person(s) in charge: Ville Mantela

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### 2.5. Laser laboratory (1569)

Permanent setups: Multi-laser characterization setup for detectors and materials [6].

Calibration activities: Optical laser power, laser power responsivity, spatial uniformity.

Temperature control: Yes

Air cleaner: Yes

Nitrogen bottle

Person(s) in charge: Kinza Maham

### 2.6. PQED laboratory (1568)

Permanent setups: Laser-based characterization setup with cryostat, Ar laser.

Calibration activities: None

Temperature control: Yes

Air cleaner: Yes

Nitrogen bottle

Person(s) in charge: Mikhail Korpusenko

### 2.7. Irradiance laboratory (1567)

Permanent setups: Solar cell spectral responsivity setup [8]. Vertical optical rail

Calibration activities: Spectral irradiance [9]

Temperature control: Yes

Humidity control: Yes

Air cleaner: Yes

Person(s) in charge: Petri Kärhä

### 2.8. UVEMA laboratory (1577)

Permanent setups: UVEMA spectral ageing setup, UV irradiance Responsivity (365 nm) setup [7]

Calibration activities: UV Irradiance responsivity

Temperature control: No

Air cleaner: No

Person(s) in charge: Petri Kärhä

### 2.9. Ageing laboratory (1566)

Permanent setups: SSL project lamps ageing

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Calibration activities: None

Temperature control: No

Air cleaner: No

Person(s) in charge: Mikhail Korpusenko

### **3. Maintenance**

#### **3.1. Humidity control units**

The humidity control units are of type Condair CP3 mini PR4. (2549113). The cylinder inside a humidity control unit has a life time of 1 – 2 years depending on the intensity of use. The replaceable cylinder is of type A240, and it is available from Etelä-Suomen Prosessisysteemi Oy (<http://www.prssystem.fi/>). Instructions for change are described in manuals. Steps:

1. Close the water inlet
2. Empty the machine from water (by pressing a button to start pump)
3. Switch the power off
4. Remove front cover
5. change the water cylinder
6. Switch power on
7. open the water inlet
8. zero the service counter. (Password 8808)

#### **3.2. Temperature control units**

If service is needed, janitors of ELEC or building responsible (Ruonio) is contacted. Inside filters should be checked once a year. Laboratory responsible takes care of this.

#### **3.3. Air circulation units**

Most of laboratories are equipped with Laminar clean air flow units.

The lab responsible persons should take care of the short-term maintenance briefly explained below.

The long-term maintenance includes replacement of the HEPA filters in 2029.

The prefilters of the units should be cleaned at least once a year.

- Turn off the unit.
- Vacuum clean all over the unit including the surface of the prefilter (an aluminium frame with a black foamy filter) on top side. Then snap out the frame from its place and wash with warm water.
- Let it dry and then snap in place.

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### 3.4. Nitrogen bottles

The nitrogen gas bottles for use with PQEDs etc. are purchased from Woikoski company, Phone: +358401662023, email: [asiakaspalvelu@woikoski.fi](mailto:asiakaspalvelu@woikoski.fi).

It is recommended to ask help from department purchasing admin<sup>1</sup> for placing the purchase order.

Order the gas bottle of type: Typpi N2 N60 50 L 200 bar DIN 10

### 3.5. Sticky carpets

The sticky mats have been purchased from UK based company Cleanrooms LTD.

Item code: MLSTMW1W, Description: Multi Layer Sticky / Tacky Mats, Small White, Case of 8.

One may ask for purchasing from VWR company that has different sizes. Purchasing Admin<sup>1</sup> may also be contacted to find better deals.

### 3.6. Gloves

Gloves may be purchased from VWR company that has both sizes in stock, 39,60/box (200 in a box). Purchasing Admin<sup>1</sup> may also find better deals from Fisher that has a similar one: <https://www.fishersci.fi/shop/products/comfort-nitrile-gloves-5/p-3702998#?keyword=Nitrile%20Gloves>, also in stock 34,20€/box (200 in a box).

### 3.7. Clean room / laboratory jackets

The laboratory jackets have been purchased from UK-based company Cleanrooms LTD.

Item code: KCVC1L Description: KLEENGUARD\* A10 Light Duty Visitor Coat, Large. Purchasing Admin<sup>1</sup> may also find better deals from other suppliers.

## 4. Publications

1. J. Hovila, P. Toivanen, and E. Ikonen, "Realization of the unit of luminous flux at the HUT using the absolute integrating-sphere method," *Metrologia* **41**, 407–413 (2004).
2. T. Poikonen, T. Pulli, A. Vaskuri, H. Baumgartner, P. Kärhä, and E. Ikonen, "Luminous efficacy measurement of solid-state lamps," *Metrologia* **49**, S135–S140 (2012).
3. P. Toivanen, J. Hovila, P. Kärhä, and E. Ikonen, "Realizations of the units of luminance and spectral radiance at the HUT," *Metrologia* **37**, 527–530 (2000).

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<sup>1</sup> Presently Charlotta Tuovinen, [charlotta.tuovinen@aalto.fi](mailto:charlotta.tuovinen@aalto.fi)

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4. F. Manoochehri, and E. Ikonen, "High-accuracy spectrometer for measurement of regular spectral transmittance," *Appl. Opt.* **34**, 3686–3692 (1995).
  5. S. Nevas, F. Manoocheri, and E. Ikonen, "Gonioreflectometer for measuring spectral diffuse reflectance," *Appl. Opt.* **43**, 6391–6399 (2004).
  6. A. Vaskuri, "Multi-Wavelength Setup Based on Lasers for Characterizing Optical Detectors and Materials," Master's Thesis, 2014.
  7. Jouni Envall, Petri Kärhä, and Erkki Ikonen, "Calibration of broadband ultraviolet detectors by measurement of spectral irradiance responsivity," *Rev. Sci. Instrum.* **77**, 063110 (2006).
  8. Petri Kärhä, Hans Baumgartner, Janne Askola, Kasper Kylmänen, Benjamin Oksanen, Kinza Maham, Vo Huynh, and Erkki Ikonen, "Measurement setup for differential spectral responsivity of solar cells," *Opt. Rev.* **27**, 195–204 (2020). <https://doi.org/10.1007/s10043-020-00584-x>
  9. T. Kūbarsepp, P. Kärhä, F. Manoochehri, S. Nevas, L. Ylianttila, and E. Ikonen, "Spectral irradiance measurements of tungsten lamps with filter radiometers in the spectral range 290 nm to 900 nm," *Metrologia* **37**, 305-312 (2000).